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Museum. He did not, however, give a figure of it. This species was technically named by Kerr in 1792 (Anim. Kingd., p. 74, no. 62) *Simia* (*Cercopithecus*) *badius*. Eight years later it was renamed by Shaw (Gen. Zool., i, pt. 1, 1800, p. 59) *Simia ferruginea*, this name being exclusively based on the "Bay Monkey" of Pennant. In 1812 E. Geoffroy (Ann. Mus. d'Hist. nat. Paris, xix, p. 92), emended Shaw's specific designation to *Colobus ferruginosus*, citing Shaw's *Simia ferruginea* as a synonym.⁵

Pennant's "Full-bottom Monkey" and his "Bay Monkey" were thus the base of the first two species of *Colobus* to receive formal technical designations, and were described from specimens from a known geographic source. Furthermore they were the only species originally referred by Illiger to his genus *Colobus* as, respectively, *Simia polycomus* Schreber and *Simia ferruginea* Shaw. The former became (by subsequent designation) the genotype of *Colobus*. The latter (*Simia badius*) is here designated the genotype of Rochebrune's genus *Ptilocolobus* (1866), as I fail to find a previous designation of a genotype for this genus.

—J. A. Allen.

RECENT LITERATURE

Grinnell, Joseph, and others. CALIFORNIA GROUND SQUIRRELS. A BULLETIN DEALING WITH LIFE HISTORIES, HABITS AND CONTROL OF THE GROUND SQUIRRELS IN CALIFORNIA. Monthly Bull. California State Comm. Horticulture, vol. 7, nos. 11 and 12, November-December, 1918, pp. 595-807, or separate pp. 1-203. January 27, 1919.

This bulletin was put forth to serve as a "manual for the use of county horticultural commissioners and systematic workers," and constitutes "a veritable textbook, through the aid of which it is now possible for the agricultural teacher throughout the public schools to place the subject clearly and concisely before the young patriots who are aiding so largely in the work of extermination."

Its scope will be indicated by the list of articles included: Natural history of the ground squirrels of California, by J. Grinnell and J. Dixon; The Columbian Ground Squirrel, by W. T. Shaw; A history of ground squirrel control in California, by W. C. Jacobsen; A study of fumigation methods for killing ground squirrels, by John S. Burd and G. R. Stewart; The Rodent Control Division, by S. V. Christieson and C. A. Wilkins; and Rodent Eradication work of the Biological Survey in California, by F. E. Garlough. Formulas for destroying rodents are given in the appendix.

The ground squirrels dealt with by Grinnell and Dixon include eighteen forms occurring in California belonging to three genera as follows: *Citellus*, twelve species or subspecies; *Callospermophilus*, three; *Ammospermophilus*, three. Shaw's paper pertains to the chief rodent pest occurring in eastern Washington and portions of neighboring states, the Columbian ground squirrel (*Citellus colum-*

⁵ In 1895, in a paper on the names of mammals given by Kerr (Bull. Amer. Mus. Nat. Hist., vii, pp. 179-192), I called attention (l. c., p. 186) to the availability of Kerr's name *badius* over Shaw's *Simia ferruginea*.

bianus). The more strictly economic contributions concern principally *Citellus oregonus* and *Citellus beecheyi* and its subspecies.

Regarding the relation of the study of the life-histories of the Californian ground squirrels to the practical problem of their control the authors (Grinnell and Dixon) state (p. 5): "It would seem that knowledge, as full as possible, of the ground squirrels of California is necessary to determining the most successful means of controlling them and to applying these means properly to the varying conditions throughout our state. This knowledge should include the main distinctions by which each may be known from its relatives, the distribution of each of the species, the extent of the burrows, the breeding rate, the food habits, and, indeed, every other class of facts obtainable relative to their natural history." Going on from this they enunciate a principle of much importance, and one which, all too often, is overlooked by the ultra practical. "It is not often apparent, in advance, which facts will and which will not prove of critical importance in economic work."

After presenting a "Key to the Ground Squirrels of California" based on those external differences which can be most readily appreciated, accounts of the species are presented. The technical matter of less general interest is presented in smaller type with headings as follows: Other names (in addition to the approved vernacular and Latin names recognized by the authors); field characters; description; color variations; measurements; weights; type locality; distribution area; specimens examined. Then follows a full account in larger type of the distribution and habits of the form.

The style is nontechnical and very readable. Perhaps the detailed presentation will discourage a few readers, but any disadvantage here is more than made up by the relative completeness of the information recorded. Possibly the accounts of habits would have been made more accessible and convenient for reference purposes by a series of side heads like those utilized in presenting the technical matter.

The paper is generously illustrated with paintings by Fuertes, photographs, mostly by Dixon, maps, line drawings, and diagrams. It is unfortunate that the paper used is of too poor a quality to do real justice to the half-tones. In spite of this the care put into the illustrations makes the paper unusually attractive. When State and Government authorities realize that severely plain literary style, cheap illustrations and a poor quality of paper are no guarantee of merit or even of true economy, and that real attractiveness is an important element of each paper, it is likely that there will be a more active demand for State and Government publications on the part of the public than is the case at present.

A number of drawings to scale of the burrow systems of the different squirrels are of interest.

No novelties in systematic status appear. The geographic range of *Citellus beecheyi beecheyi*, formerly believed to embrace the Upper Sonoran, Lower Sonoran and Transition zones of west-central California throughout the coast region as far south as Ventura County, is now extended southward to include the coastal portions of the State to the Mexican line, the range of *C. b. fisheri* being correspondingly restricted.

That systematic work may possess at times considerable importance from the standpoint of economic problems is indicated by certain facts concerning the

Douglas ground squirrel. Apparently differences in color separating this squirrel from others in California are associated with differences in habitat and food preference as well (p. 53). It is unfortunate that there are those who question the value of systematic work, description, and classification. As the eminent English mammalogist Hinton says, ". . . so many have yet to learn that all branches of science are valuable and interdependent, that in reality there are not two kinds of science—one called 'applied,' essential, it extracts gold; the other called 'pure,' quite unimportant it extracts nothing but facts." (M. A. C. Hinton, *Rats and mice as enemies of mankind*, British Museum of Natural History, London, 1918, pp. 26-27.)

Further on in the account of the Douglas squirrel the principle is enunciated that "the squirrels require a certain amount of space around them so that they can have a fair show of reaching the safety of their burrows after an enemy is first caught sight of" (p. 54). This principle is apparently of general application among the Sciuridæ.

While in the past, hibernation of animals as a result of the effect of cold and snow has been emphasized, estivation due to a lack of moisture has hardly received its share of attention. Recent investigations have demonstrated its importance. Thus Grinnell and Dixon show that the Oregon ground squirrel of the warm Upper Sonoran and Transition zones of northern California disappears from view during July and does not reappear until the following March (pp. 66-67). On the other hand the Belding ground squirrel (*Citellus beldingi*) of the cold Hudsonian Zone of the high Sierra Nevada does not become quiescent until a full two months later than the Oregon ground squirrel (p. 72).

The immensity of losses to agriculture caused by squirrel pests is seldom fully appreciated. The authors' studies of *Citellus oregonus* lead them to conclude that 30 grams of forage are eaten daily by each individual. In thickly settled squirrel country the average number of the animals per square mile is estimated at 70,000. This number will consume 2,100,000 grams, or more than 2 tons of green forage per square mile every day. "Granted that a grazing steer eats 50 pounds of pasture forage each day, we conclude that the squirrels on a square mile of pasture appropriate each day the forage which might support ninety head of cattle" (p. 63).

W. T. Shaw's paper on the Columbian ground squirrel (pp. 118-128) is worthy of more than casual attention. This contribution, based on years of work by the author, is all too short, and impels the reader to look with keen anticipation to the publication of the full report of Professor Shaw's illuminating investigations. These ground squirrel papers of Grinnell and Dixon and of Shaw are of a type of zoological investigation which has been all too rare in mammalogy, particularly in this country.

Much credit is due to the State leaders of rodent control in California for the enlightened manner in which they are dealing with their problems. If those in charge of practical projects of rodent control and animal administration generally made as vigorous efforts to stimulate scientific research of a basic character and then to utilize the results thereof, there is no doubt whatever that greater progress would be achieved than is now the case.

—Walter P. Taylor.